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ABSTRACT

Current instructional uses of computers primarily involve an individualized approach which requires assigning one student per computer. However, the computer can also serve as an "electronic chalkboard" in small and large group instruction in the middle school. The equipment required for the electronic chalkboard include: (1) the computer console-keyboard; (2) a large television set or monitor; and (3) a data storage unit. Software requirements for implementing the electronic chalkboard depend on the actual instructional strategies the teacher plans to use. These include screen control programs which allow material to be typed and seen immediately on the screen. Advantages of the electronic chalkboard in this case include overcoming teachers' concern about readable handwriting, no chalkdust on teachers' clothing, and material on the screen having a neat and authoriative appearance. Other programs for instructional purposes are templates (patterns which can be reproduced quickly so that different information can be entered into the pattern each time), graph-makers, animators, and those designed for group activities (such as spelling competitions). The programs and ideas discussed are only examples of group instructional applications useful to a wide range of elementary/secondary teachers. (JN)

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The Electronic Chalkboard and Other Group Instructional Uses of the Computer*

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The chalkboard is virtually indispensible in the classroom. It is useful for presenting lesson outlines, listing student assignments, recognizing star students, or diagramming assigned problems. Today, the chalkboard's flexibility, versatility and effectiveness in group instruction can be enhanced with the aid of a small computer. This article outlines several applications of the computer as a tool in small group and class instruction in the middle school.

Rationale

Currently the instructional uses of computers have primarily involved the individualized approach which requires assigning one pupil per computer. However, middle school teachers use various approaches, including large group instruction, small group instruction and individualized instruction. For these teachers, computer applications designed for group instruction are as suitable for their teaching approach as are computer materials designed for individualized instruction.

Some characteristics of the computer such as animation, rapid computations, color graphics, music, sound effects, data storage, and its interactive capability are not available on other instructional media like the regular chalkboard. When these capabilities of the computer are used, the computer can become a powerful instructional tool.

With the electronic media accepted as reliable and authoritative, teachers find increased student motivation and attention when instructional material is presented on the large television screen.

As budget constraints limit the number of computers in schools, it is not possible to provide a computer for each pupil. However, when the computer is connected to a large monitor or television set, the teacher and the entire

class can work with the computer. Thus more pupils can be involved with fewer computers in the arrangement.

Classroom Arrangement for the "Electronic Chalkboard"

A. Equipment requirements. The equipment required for the "electronic chalkboard" include: (1) the computer console-keyboard; (2) a large television set or monitor (19 inch screen or larger), and (3) a data storage unit. The computer console should be positioned so that the teacher can use it conveniently while talking to the class. Since the teacher may be calling upon students to type on the keyboard during class discussion, the keyboard should also be at a height which is workable for the students. The large television set or monitor serves as the display screen. It should be placed high enough for all students in the classroom to view comfortably. Ideally, it should be mounted on a portable cart so it may be used in several areas in the classroom. The television display screen is connected to the computer console-keyboard, which in turn, is linked to supporting peripherals such as a disk drive or cassette tape recorder for data and program storage, and a printer to create paper copies of the materials created on the computer.

For teachers or schools on limited budgets, the essential components are the computer console, a cassette tape recorder, and the large television or monitor. Most schools already have available 19-inch or larger television sets or monitors for showing videotapes or educational television programs. These sets could be used for the "electronic chalkboard." As an alternative, discarded television sets can be obtained and inexpensively rewired to serve as the display screen. The printer is optional.

It is possible to use most of the currently popular microcomputers as

"electronic chalkboards." Computers designed to use separate television sets or monitors(e.g. Commodore 64, Apple II+ or IIe, TI-99/4A, IBM-PC, Atari 800, TRS-80 Color Computer)[1] are well suited for this purpose. Computers with built-in display screens such as TRS-80 Model III or Commodore PETs and CBMs may need specially designed cables to connect them to the large display screen. Computers with 16K bytes of Random Access Memory(RAM) are adequate for most group classroom applications, although computers with greater memory capacity increase the flexibility and scope of the applications.

B. Software requirements. The software needed for implementing the electronic chalkboard depends on the actual instructional strategies the teacher plans to use with this electronic chalkboard. Since the uses of the electronic chalkboard will be novel to most teachers, the applications are mainly experimental. Examples of software applications are outlined in the next section.

Programs for Group Instruction

All of the programs described here are available as commercial software, as ready-to-type programs in textbooks or periodicals, or have been have been written in Language BASIC by educators.

1. "Chalkboard" for text material. As a start, a screen control program is useful. Such a program allows the teacher to type material so that it appears on the screen immediately. This procedure is like writing the same material on the ordinary chalkboard during class. Teachers typically use the ordinary chalkboard for such diverse purposes as listing vocabulary words, outlining lecture points, listing daily reading assignments, and solving arithmetic problems. This screen control program permits the teacher to make

similar applications on the television screen. The immediate advantages of the electronic chalkboard include the following: (1) It overcomes the teachers' concern about readable handwriting; (2) There is no chalkdust on teachers' clothing; and (3) The material on the screen has a neat and authoritative appearance.

It is also possible to store the written material on a disk or cassette tape for later use. Teachers often try to keep material on the board for the next day by writing "SAVE" on the board, only to have the janitorial staff erase the board anyway. These teachers will appreciate the computer's capacity to keep their material overnight for use the next day. The material may be saved for an indefinite time period such as the next academic term or the following school years. Teachers who repeat the same lesson to several periods of classes during the day find the computer's ability to save material valuable. They typically find that it is easier to redo the chalkboard material by pressing a few keys on the keyboard rather than rewriting everything on the board again. In addition to being able to save the material written on the board in class, teachers can prepare class presentation materials in advance and display these materials in class without rewriting them on the board.

If a printer is attached, the material that the teacher displayed on the screen may be sent to the printer for the teacher's record, or for duplication and distribution to the students in class.

2. Templates. Templates are patterns which can be reproduced quickly so that different information can be entered into the pattern each time. Permanent templates can be very helpful to teachers who use a particular

format on the chalkboard time after time. For example, in language arts, the teacher who is teaching sentence diagramming can use a template of the basic sentence structure. Each new sentence is displayed at the top of the screen and the computer places words in the appropriate diagram positions when the teacher identifies the part of speech for that word. Similarly the math or arithmetic teacher might find a template of a specific math configuration or formula useful. A template of the treble and bass cleffs is helpful in music classes. Template maps of the United States or regions of U.S. are valuable in social studies.

3. Graph-maker programs. The computer's ability to do rapid computations makes it a handy tool for instruction in various subjects when using graphs to illustrate and present information. Commercial programs are available which create bar graphs, pie charts, line graphs or other types of charts and graphs when the necessary information is entered. It is also possible to create individual programs for a particular type of graph required by the teacher.

Graph-making programs are useful to teachers and students when the subject of graph-making and graph interpretation itself is taught. The computer's ability to quickly demostrate the relationship between data and the corresponding graph make it possible for the teacher to illustrate many examples of graphs in a short period of time. Also, students can experiment extensively and get immediate feedback on their developing ideas of how graphs function when using such a graph-making program. Middle school teachers can use the graph-making programs to illustrate concepts and patterns in whatever

subject they are teaching. In addition, the results of surveys, such as surveys of the students' opinion patterns, can be summarized and charted immediately using the graph-making programs. Student interest in a topic is likely to increase when their patterns are graphically compared against students in another classroom or against national averages. Occasionally, teachers may ask students to supplement their oral presentations of term projects in social studies with graphs which are presented on the computers.

4. Animation. Some of the applications described above can be done in the classroom using traditional media such as an overhead projector, a slide projector or the ordinary chalkboard. However these media do not have the capability of creating moving graphics or animation such as those which can be designed on many computers. Animated graphics are most commonly seen in video and arcade games, and in some commercially prepared instructional materials. Moving graphics have a particularly dramatic effect in comparison to similar material presented in a static media. A simple application of animation is to have the computer program draw a line graph dynamically. For example, in a social studies class, the group can be shown the parameters of a graph showing the inflation rate from 1970 to 1983. After explaining the graph to the class, the teacher can direct the computer to begin drawing the line graph. The graph is programmed to unfold slowly from left-to-right. More complex animation sequences can be used to show geography concepts such as the routes of European explorers, or American fur traders. Animation can be used as a tool for language arts activities. For example, pupils can be asked to develop an essay or tell an imaginative story after viewing a short animated

sequence on the screen.

5. Classroom Group Activities. It is possible to use the large screen computer setup to conduct skill-building games and simulations involving the whole class. For example, the classroom game known as "Spelling Bee" can be converted into a computer-directed classroom activity. Two groups of students could compete while the computer selects vocabulary words at random, checks the students' spelling, and keeps the score. In foreign language classes, a similar classroom game can quiz students on lists of new Spanish or French words and their English translations. Other classroom activities which test students' ability to identify states and their capitals, authors or artists and their works, or any other concepts and their definitions can be presented in a classroom game format on the computer. These activities serve as reinforcements of concepts in the curriculum. The color graphics and sound effects capabilities of computers increase the dramatic effects of ordinary classroom games and activities.

6. Other Applications. With a bit of imagination, teachers can adopt some of the currently available individualized courseware materials to be used for group instruction. For example, some drill programs and tutorial activities typically found in computer-assisted- instruction packages are useable for group instructional purposes. The materials which teachers develop using authoring tools (such as PILOT) may be created for group instruction as well as for individual student tutorials.

Conclusion

In contrast to the classroom applications of computers which are individually oriented, this article has explored the uses of the computer as a

tool for group instruction. The screen control programs, templates, graphing programs, animation, and classroom group activities were suggested as examples of group instructional applications which are useful to a wide range of elementary and secondary school teachers. The electronic chalkboard is not intended replace the traditional chalkboard. Instead it is a helpful adjunct to it. As teachers begin to think about and use computers for group instruction, numerous other valuable applications of the "electronic chalkboard" will emerge.

Footnote

[1]Commodore 64 is a registered trademark of Commodore Business Machines, Inc.; Apple II+ and Apple IIe are registered trademarks of Apple Computers, Inc.; TI-99/4A is a registered trademark of Texas Instruments, Inc.; IBM-PC is a registered trademark of IBM Corporation; Atari 800 is a registered trademark of Warner Communications, Inc.; TRS-80 Color Computer is a registered trademark of Tandy Corporation.